LISTING OF THE CLAIMS

Claim 1. (Previously Presented): A coated cutting tool member whose hard coating layer exhibits a superior chipping resistance during a high speed and severe cutting operation, the coated cutting tool member comprising:

a hard substrate; and

a hard coating layer of a nitride compound containing Ti, Al, and Zr, which is formed on a surface of the hard substrate using a physical vapor deposition method at an overall average thickness of 1 to 15 μm, wherein

the hard coating layer has a component composition profile in which maximum Al containing points and minimum Al containing points appear alternately and repeatedly at a predetermined interval in a direction of thickness of the hard coating layer, and the amount of contained Al component continuously varies from the maximum Al containing points to the minimum Al containing points and from the minimum Al containing points to the maximum Al containing points,

the maximum Al containing points satisfy a composition formula of $(Ti_{1-(X+Y)}Al_XZr_Y)N$ (where X indicates an atomic ratio of 0.45 to 0.65, and Y indicates an atomic ratio of 0.01 to 0.15) and the minimum Al containing points satisfy a composition formula of $(Ti_{1-(X+Y)}Al_XZr_Y)N$ (where X indicates an atomic ratio of 0.15 to 0.40, and Y indicates an atomic ratio of 0.01 to 0.15), and

a distance between one of the maximum Al containing points and adjacent one of the minimum Al containing points is from 0.01 to 0.1 μm.

Claim 2. (Previously Presented): A coated cutting tool member exhibiting a superior wear resistance, comprising:

a hard substrate; and

a hard coating layer of a nitride compound containing Ti and Al which is formed on a surface of the hard substrate using a physical vapor deposition method at an overall average thickness of 1 to 10 μm, wherein

the hard coating layer comprises Zr at an atomic ratio of 0.002 to 0.1, and at least one of Y and Ce at an atomic ratio of 0.0005 to 0.05 in a coexistence state

the hard coating layer has a component composition profile in which maximum Al containing points and minimum Al containing points appear alternately and repeatedly at a predetermined interval in a direction of thickness of the hard coating layer, and the amount of contained Al component continuously varies from the maximum Al containing points to the minimum Al containing points and from the minimum Al containing points to the maximum Al containing points,

maximum Al containing points contain Al component at an atomic ratio of 0.40 to 0.60 with respect to entire metal components, and the minimum Al containing points contain Al component at an atomic ratio of 0.05 to 0.25 with respect to entire metal components, and

a distance between one of the maximum Al containing points and adjacent one of the minimum Al containing points is from 0.01 to 0.1 μm.

Claim 3-4. (Canceled).

Claim 5. (Previously Presented): A coated cutting tool member according to claim 1, wherein the hard substrate is made of hard metal containing tungsten carbide.

Claim 6. (Previously Presented): A coated cutting tool member according to claim 1, wherein the hard substrate is made of cermet containing titanium carbonitride.

Clam 7. (Previously Presented): A coated cutting tool member according to claim 1, wherein the hard substrate is made of sintered material containing cubic boron nitride.

Claim 8. (Previously Presented): A method for forming a hard coating layer exhibiting a superior chipping resistance during a high speed and severe cutting operation on a surface of a cutting tool substrate, the method comprising:

mounting the cutting tool substrate on a turntable housed in an arc ion plating apparatus at a position radially away from a center axis of the turntable in a manner rotatable about an axis of the cutting tool substrate;

producing a nitrogen gas atmosphere as the reaction atmosphere in the arc ion plating apparatus; and

generating arc discharge between a cathode electrode of a Ti-Al-Zr alloy piece for forming maximum Al containing points and an anode electrode, and between another cathode electrode of a Ti-Al-Zr alloy piece for forming minimum Al containing points, which is disposed so as to oppose to the other cathode electrode with respect to the turntable, and another anode electrode, so that a hard coating layer of a nitride compound containing Ti, Al, and Zr having overall average thickness

of 1 to 15 μm is formed, by a physical vapor deposition method, on the surface of the cutting tool substrate being turned while rotating on the turntable about an axis of the cutting tool substrate, wherein

the hard coating layer has a component composition profile in which the maximum Al containing points and the minimum Al containing points appear alternately and repeatedly at a predetermined interval in a direction of thickness of the hard coating layer, and the amount of contained Al component continuously varies from the maximum Al containing points to the minimum Al containing points and from the minimum Al containing points to the maximum Al containing points,

the maximum Al containing points satisfy a composition formula of $(Ti_{1-(X+Y)}Al_XZr_Y)N$ (where X indicates an atomic ratio of 0.45 to 0.65, and Y indicates an atomic ratio of 0.01 to 0.15) and the minimum Al containing points satisfy a composition formula of $(Ti_{1-(X+Y)}Al_XZr_Y)N$ (where X indicates an atomic ratio of 0.15 to 0.40, and Y indicates an atomic ratio of 0.01 to 0.15), and

a distance between one of the maximum Al containing points and adjacent one of the minimum Al containing points is from 0.01 to 0.1 μm.

Claim 9. (Previously Presented): A coated cutting tool member according to claim 8, wherein the hard substrate is made of hard metal containing tungsten carbide.

Claim 10. (Previously Presented): A coated cutting tool member according to claim 8, wherein the hard substrate is made of cermet containing titanium carbonitride.

Claim 11. (Previously Presented): A coated cutting tool member according to claim 8, wherein the hard substrate is made of sintered material containing cubic boron nitride.

Claim 12. (Previously Presented): A coated cutting tool member according to claim 2, wherein the hard substrate is made of hard metal containing tungsten carbide.

Claim 1. (Previously Presented): A coated cutting tool member according to claim 2, wherein the hard substrate is made of cermet containing titanium carbonitride.

Claim 14. (Previously Presented): A coated cutting tool member according to claim 2, wherein the hard substrate is made of sintered material containing cubic boron nitride.

Claim 15. (Previously Presented): A coated cutting tool member exhibiting a superior wear resistance, comprising:

a hard substrate; and

a hard coating layer of a carbonitride compound containing Ti and Al which is formed on a surface of the hard substrate using a physical vapor deposition method at an overall average thickness of 1 to 10 μm, wherein

the hard coating layer comprises Zr at an atomic ratio of 0.002 to 0.1, and at least one of Y and Ce at an atomic ratio of 0.0005 to 0.05 in a coexistence state,

the hard coating layer has a component composition profile in which maximum Al containing points and minimum Al containing points appear alternately and repeatedly at a

predetermined interval in a direction of thickness of the hard coating layer, and the amount of contained Al component continuously varies from the maximum Al containing points to the minimum Al containing points and from the minimum Al containing points to the maximum Al containing points,

maximum Al containing points contain Al component at an atomic ratio of 0.40 to 0.60 with respect to entire metal components, and the minimum Al containing points contain Al component at an atomic ratio of 0.05 to 0.25 with respect to entire metal components, and

a distance between one of the maximum Al containing points and adjacent one of the minimum Al containing points is from 0.01 to 0.1 μm.

Claim 16. (Previously Presented): A coated cutting tool member according to claim 15, wherein the hard substrate is made of hard metal containing tungsten carbide.

Claim 17. (Previously Presented): A coated cutting tool member according to claim 15, wherein the hard substrate is made of cermet containing titanium carbonitride.

Claim 18. (Previously Presented): A coated cutting tool member according to claim 15, wherein the hard substrate is made of sintered material containing cubic boron nitride.